(C) deagglomerating said cake to obtain a suspension of agglomerates having a median diameter D50 smaller than 5 μm, whereby a suspension of low viscosity is provided and wherein said deagglomerating is conducted under conditions that result in a silica suspension which possesses a stability such that the amount of silica in the supernatant obtained after centrifuging said suspension at 7500 revolutions per minute for 30 minutes represents more than 50% of the weight of the silica initially present in the suspension.

REMARKS

Entry of the foregoing amendments, reconsideration and reexamination of the subject application, as amended, pursuant to and consistent with 37 C.F.R. §1.112, and in light of the remarks which follow, are respectfully requested.

At the outset, it is noted that all of the claims stand rejected based on prior art. Essentially, the Examiner remains of the opinion that the claimed invention would have been obvious based on the teachings of Chevallier alone or in view of Cox et al. This rejection is respectfully traversed. However, prior to specifically addressing the rejection, the present invention and its inherent advantages are discussed below.

Specifically, the subject invention is directed to a method for the preparation of an aqueous suspension of precipitated silica and precipitated silica obtained by such method which possesses a solids content ranging from 10 to 40% by weight, a viscosity lower

than $4x10^{-2}$ Pa.s at a shear rate of 50 s^{-1} and wherein the amount of silica present in the supernatant obtained after centrifugation of the suspension at 7500 revolutions per minute for 30 minutes represents more than 50 % by weight of the silica present in the suspension. As discussed in the subject application, the present invention solves a significant need in the art. Namely, the present invention provides a novel method and novel products produced by such method which comprises a silica suspension having a high solids content, which possesses enhanced stability as determined by a settling test recited in the claim, which comprises centrifugation of the suspension at 7500 revolutions per minute for 30 seconds. After such method, the quantity of silica present in the supernatant obtained is measured after drawing at 160° C until the constant weight of material is obtained, and represents more than 50 % and preferably more than 60 % of the weight of the silica present in the suspension. Indeed, advantageously the amount of silica represented in the suspension will be more than 70 % and even more than 90 % by weight of the silica present in the suspension.

The silica suspensions of the present invention are advantageous in various industrial context, especially in the field of paper making and concrete manufacture. In such methods, it is essential to have suspensions having a high solids content and possessing good stability characteristics. Also, it is necessary to provide suspensions which possess good filtering characteristics.

The present invention is advantageous in all these respects. Specifically, the present invention as discussed above is highly stable, which makes the subject suspension more easy to transport or store. Moreover, the present invention provides suspensions having a viscosity which is sufficiently low to make it pumpable and therefore suitable for industrial use. These advantages are discussed at length in the subject application.

Applicants respectfully submit that a silica suspension or a method as claimed is not taught or suggested by the prior art.

By contrast, Chevallier teaches an aqueous suspension of precipitated silica as well as a method of its preparation which is produced by the following steps: precipitating silica filtrating the pump to provide a filter cake drying the cake wherein drying is performed verbally by spray drying, to produce a cake having a dry salts content greater than 18 % by weight, and wherein between filtration and drying, the filtration cake may be subjected to a disintegrating operation, for example, by transferring the cake into a colloidal or ball-type mill. The product is recovered after the drying step is eventually ground and a precipitated silica is obtained having a mean particle size of 5-7 μm. However, Chevallier fails to teach or suggest a method or silica suspension product as claimed.

As previously argued, Chevallier merely teaches a silica suspension having a 4 % concentration of silica, and alleges that a concentration of 20 % is desirable. However, Chevallier fails to teach or suggest the product of the present invention or how the

advantage of such a product. Specifically, Chevallier fails to teach or suggest silica suspensions having the stability characteristics of those of the present invention. In this regard, it should be noted that the method of the present invention differs from that of Chevallier at least in the fact that it comprises a step C which comprises deagglomerating a silica precipitation cake having a solids content ranging from 10 to 40 % to obtain a suspension of agglomerates having a mean diameter D50 smaller than 5 micrometers whereby a suspension of low viscosity is provided, and which suspension possesses the recited solids content of 10-40 % by weight, a viscosity of lower than $4x10^{-12}$ Pa.s at a shear rate of 50 s^{-1} and wherein the amount of silica remaining after centrifugation at 7500 revolutions per minute for 30 minutes is more than 50 % by weight of the silica present therein. Rather, in the methods of Chevallier, the silica suspensions are obtained by disintegrating of the silica cake and therefore do not possess the high stability of the silica suspensions of the present invention. Thus, the present invention is directed to a method and product, both of which are substantially different than that of Chevallier. Applicants respectfully submit that Chevallier provides no motivation to modify their methods by the addition of a deagglomeration step which is conducted so as to obtain a suspension having a particle size as recited in the claims. Rather, Chevallier merely suggests that at the ends of steps A-C the precipitated silica in the form of a powder will possess a mean diameter between 5 and 70 micrometers. Applicants further respectfully submit that the objective of Chevallier is not to produce a silica suspension having a low

viscosity but rather a precipitated silica in solid form that may be used as reinforcing filler for elastomers.

Previously, Applicants stressed the importance of the deagglomeration step and the mean particle size as well as the particle size distribution obtained in such a step which is significant with respect to the low viscosity and stability of the silica suspension obtained at the end as an end product of the present invention.

As Chevallier provides no motivation to include such a step, at the very least the method claims should be in condition for allowance. Also, as the product obtained by such a method is clearly different than that of the prior art, the claims directed to the silica suspension should be allowable as well.

However, in further support of the novel and nonobvious features of the claimed invention, Applicants further provide with this response, the results of comparative tests which demonstrate that silica suspensions produced according to Chevallier, which are obtained by disintegration of a silica cake, do not exhibit the high stability of those of the present invention. The attention of the Examiner is respectfully directed to pages 3 and 4 of the declaration, wherein the declarant explains comparative tests which were performed wherein 5 silica precipitation cakes prepared according to example 2 of the subject application were compared to silica cakes produced according to Chevallier, as well as cakes produced wherein steps A and B of the claimed methods were affected. Thereafter, each cake obtained was submitted to chemical crumbling with sodium

aluminate solution as disclosed in Chevallier followed by deagglomeration step performed in a controlled manner as described in the declaration. Based on the results which are contained in Table 1 of the declaration, it may be seen that compositions of examples 4 and 5 which were produced according to the present invention, comprise a significantly greater silica content after centrifugation under 750 rpms for 30 minutes. Moreover, it can be seen from these comparative results, that the viscosity of the suspension varies significantly as a function of the deagglomeration time. Therefore, these results demonstrate that the inclusion of a deagglomeration step results in a significant decrease in the resultant suspension thereby resulting in a product which is pumpable and sprayable. Also, these results demonstrate that the deagglomeration time is highly significant to stability. In particular, only those compositions which were agglomerated for at least 15 minutes resulted in a suspension having the stability characteristics of the present invention. Applicants respectfully submit that these results are unexpected, since there is nothing in the prior art which would suggest that such an intensive deagglomeration would result in such an enhancement instability, which is apparently attributable to reagglomeration phenomena. Moreover, as noted in the declaration, the solution is not obvious based on the state of the prior art. Rather, conventionally difficulties with respect to the production of suitable silica suspensions are cured by the addition of stabilizing compounds such as dispersing agent. Consequently, it was not obvious that a stable silica suspension as claimed would have

been obtained by virtue of a high mechanical deagglomeration step without the need for chemical stabilization.

For the reasons set forth above, the inclusion of such a step is not fairly suggested by Chevallier. Rather, as discussed, the object of Chevallier is to produce a silica suspension having a high solid content and viscosity which is sufficiently low to allow the suspension to be pumped and subsequently sprayed. Therefore, the deagglomeration step disclosed in Chevallier is a conventional method which was known in the art for converting to a water silica mixture a sufficient fluidity to allow such mixture to be pumped and sprayed.

It is noted that in the most recent Office Action, the Examiner suggests that a composition possessing the stability of that of the present invention would have been obvious based on the teachings of Chevallier. However, the position of the Examiner is respectfully but strenuously traversed. Contrary to the Examiner's assertion, the properties of a particular silica suspension based on the method by which it is produced is difficult to predict. Therefore, it was completely surprising that the addition of an agglomeration step as in the present invention resulted in a silica suspension possessing high stability. The unpredictability associated with such suspensions and methods for their production is substantiated by French Patent Application 2453880 which is attached to this Reply which describes the production of dry silica particulates produced from an aqueous slurry of precipitated silica having a high solid content. Also, for the Examiner's

convenience, a copy of the U.S. counterpart application, now U.S. Patent 6,013,324, is also provided. The Examiner is respectfully referred to page 7, lines 21-27 of the French application, wherein it is specifically noted that the production of a silica suspension is not well known. Specifically, a translation of this passage reads as follows: "although only hypothesis can presently be advanced concerning the explanation of the process according to the invention, it appears that the evolution in the suspension, from the step of obtaining a suspension by precipitation to the step of obtaining suspension via atomization, should be important".

This document supports Applicants' arguments, that an initial high dispersion of silica in a silica suspension does not necessarily or predictably ensure a high stability of the suspension in time. This is because of potential reagglomeration that may occur during sedimentation processes. Consequently, in order to obtain a silica slurry having a high solid content which possesses good stability over time, there would have been no reason to expect that including a physical deagglomeration step of the silica slurry as in the present invention would meet such objective. Indeed, as argued above, there is absolutely nothing in Chevallier which would teach or suggest such a step.

Moreover, one skilled in the art who had incentive to produce a silica suspension having a high stability would not have been motivated to include specific precipitation steps A and B as recited in Chevallier in order to produce a filter cake which is then subjected to a specific deagglomeration step as in the present invention. They would not

have been motivated to do so, because the objective of Chevallier was to produce dry precipitated silica and not to produce a silica suspension having a good stability over time. Therefore, Applicants respectfully submit that the Examiner's rejection is based on improper hindsight reconstruction of the claimed invention.

Rather, as supported by the affidavit provided herewith, once motivated to produce a silica suspension which is stable over time, would have looked to similar solutions in patents relating to similar subject matter. As explained in the declaration, conventionally silica suspensions having high stability over time are produced by the addition of chemical stabilizing agents such as dispersants. Therefore, if one skilled in the art had the objective of producing such a stable suspension, they would have looked to the incorporation of such stabilizer, and not the physical deagglomeration step included in the present invention.

Therefore, based on the foregoing, withdrawal of the § 103 rejection of Claims 22-37 and 39-45 based on Chevallier et al is respectfully requested.

Claims 38 and 46 further stand rejected based on Chevallier in view of Cox et al. Chevallier has been discussed above. For the reasons set forth therein, this reference fails to teach or suggest silica suspensions possessing the recited stability or a method for the production thereof. The addition of Cox does not cure the deficiencies of Chevallier. Cox is applied merely to suggest the washing of the product of Chevallier with an organic solvent in order to produce a pure composition. For the reasons set forth above, such

combination would not teach or suggest the claimed invention, as the product produced according to Chevallier differs significantly at least in viscosity and stability as measured according to the settling test according to the present invention. Therefore, withdrawal of the § 103 rejection of Claims 38 and 46 based on Chevallier in view of Cox is further respectfully believed to be in order.

Based on the foregoing, this application is believed to be in condition for allowance. A notice to that effect is respectfully solicited. However, if any issues remain outstanding, the Examiner is respectfully requested to contact the undersigned so that prosecution may be expedited.

Respectfully submitted,

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